

II. SPECIFICATION AMENDMENTS

Please amend paragraph [0002] on page 1 as follows:

[0002] According to a known technique commonly referred to as "swept homodyne interferometry", a DUT is implemented in one of the interferometer arms of an interferometric measurement set-up introducing an additional wavelength dependent optical path length. A laser source is swept over a range of wavelengths. Due to a discrepancy of the arm lengths a modulated signal - the interferogram - is observed at a detector. The set-up is comparable to a Mach-Zehnder set-up when viewed in transmission, and to a Twyman-Green interferometer when viewed in reflection. More details concerning this approach can be found in "Phase and Group Delay Relation in Swept Homodyne Interferometry" by Thomas Jensen, and in EP-A-1202038 by the ~~same~~ applicant, the teaching thereof shall be incorporated herein by reference.

Please amend paragraphs [00039], [00040], and [00041] on page 12 as follows:

[00039] At the output of the DUT 14, two light waves u_1 and u_2 are obtained that can be expressed as follows:

$$\begin{aligned} u_1 &= a_1 \cdot \exp[2\pi i \cdot f(t - \tau_1) \cdot (t + \tau_1)] \\ u_2 &= a_2 \cdot \exp[2\pi i \cdot f(t - \Delta T - \tau_2) \cdot (t + \Delta T + \tau_2)] \end{aligned} \quad (4)$$

$$\begin{aligned} u_1 &= a_1 \cdot \exp[2\pi i \cdot f(t_0 - \tau_1) \cdot (t_0 + \tau_1)] \\ u_2 &= a_2 \cdot \exp[2\pi i \cdot f(t_0 - \Delta T - \tau_2) \cdot (t_0 + \Delta T + \tau_2)] \end{aligned} \quad (4)$$

[00040] From these expressions for the light waves u_1 and u_2 , the time dependence of the power detected by the power meter can be derived:

$$P(t) = |u_1 + u_2|^2 = a_1^2 + a_2^2 + 2 \cdot a_1 \cdot a_2 \cdot \cos[2\pi \cdot f(t - \tau_1) \cdot (t + \tau_1) - 2\pi \cdot f(t - \Delta T - \tau_2) \cdot (t + \Delta T + \tau_2)] \quad (5)$$

$$P(t_0) = |u_1 + u_2|^2 = a_1^2 + a_2^2 + 2 \cdot a_1 \cdot a_2 \cdot \cos[2\pi \cdot f(t_0 - \tau_1) \cdot (t_0 + \tau_1) - 2\pi \cdot f(t_0 - \Delta T - \tau_2) \cdot (t_0 + \Delta T + \tau_2)] \quad (5)$$

[00041] The terms a_1^2 and a_2^2 are constant, and therefore, the interference pattern detected by the power meter is caused by the cosine term. In the following, the ~~phase $\phi(t)$~~ phase $\phi(t_0)$ of said cosine term will be analyzed more closely. The ~~phase $\phi(t)$~~ phase $\phi(t_0)$ can be written as follows:

$$\frac{1}{2\pi} \phi(t) = [f(t - \tau_1) - f(t - \Delta T - \tau_2)] \cdot t + f(t - \tau_1) \cdot \tau_1 - f(t - \Delta T - \tau_2) \cdot (\Delta T + \tau_2) \quad (6)$$

$$\frac{1}{2\pi} \phi(t_0) = [f(t_0 - \tau_1) - f(t_0 - \Delta T - \tau_2)] \cdot t_0 + f(t_0 - \tau_1) \cdot \tau_1 - f(t_0 - \Delta T - \tau_2) \cdot (\Delta T + \tau_2) \quad (6)$$

Please amend paragraphs [00043] and [00044] on pages 12 and 13 as follows:

[00043] Usually, the path difference ΔL between the first and the second light path is chosen such that the frequency difference Δf assumes a value within the desired range. For example, when $\Delta L = 200\text{m}$, ΔT will be in the order of

microseconds, and Δf will be in the order of 5 MHz. Different orders of magnitude might be used as well. Anyway, the relation $\Delta\tau \ll \Delta T$ generally holds, and for this reason, the frequency difference at the DUT output is approximately equal to Δf :

$$\cancel{f(t-\tau_1)} - \cancel{f(t-\Delta T-\tau_2)} \approx \Delta f \quad (7)$$

$$\underline{f(t_0-\tau_1) - f(t_0-\Delta T-\tau_2) \approx \Delta f} \quad (7)$$

[00044] When inserting $\Delta\tau$ and Δf in the above formula (6), the following expression for the phase $\cancel{\phi(t)} - \underline{\phi(t_0)}$ is obtained:

$$\frac{1}{2\pi} \cancel{\phi(t) = \Delta f \cdot t + f(t-\tau_1) \cdot \tau_1 - (f(t-\tau_1) + \Delta f) \cdot (\Delta T + \tau_2)}$$

$$\frac{1}{2\pi} \cancel{\phi(t) = \Delta f \cdot t + f(t-\tau_1) \cdot \Delta\tau - f(t-\tau_1) \cdot \Delta T - \Delta f \cdot \Delta T - \Delta f \cdot \tau_2} \quad (8)$$

$$\frac{1}{2\pi} \phi(t_0) = \Delta f \cdot t_0 + f(t_0-\tau_1) \cdot \tau_1 - (f(t_0-\tau_1) + \Delta f) \cdot (\Delta T + \tau_2)$$

$$\underline{\frac{1}{2\pi} \phi(t_0) = \Delta f \cdot t_0 + f(t_0-\tau_1) \cdot \Delta\tau - f(t_0-\tau_1) \cdot \Delta T - \Delta f \cdot \Delta T - \Delta f \cdot \tau_2} \quad (8)$$

Please amend paragraph 56 on page 16 as follows:

[00056] Furthermore, a polarization controller might be added to at least one of the light paths. Fig. 4 shows a polarization controller 26 (with dashed lines) that has been added to the first light path 14. The polarization controller 26 changes the polarization of the first light path's signal in a way that at the input of the beam combiner 16, the polarization of the first light path's signal is substantially equal to the polarization of the

second light path's signal. When the polarization in both paths is identical, the best contrast of the interferograms is obtained. For example, in case both signals oscillate within the same plane of polarization, the contrast of the interferogram reaches its optimum. According to an alternative embodiment, the contrast of the interferograms can be optimized by using polarization-maintaining fibers both in the first and the second light path. Also in this case, the states of polarization of the signals received via the different light paths are substantially identical at the input of the beam combiner 167.